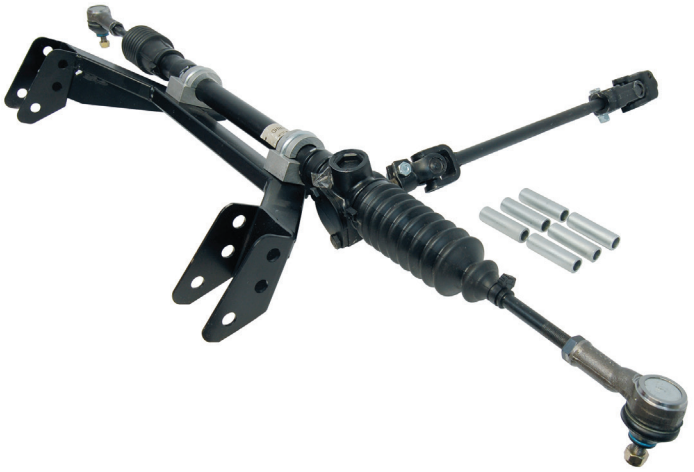
Steering Rack Conversion

PART # 667-248 or TTK3000L

Installation Instructions

Triumph TR2 - TR3B

440 Rutherford St. Goleta, CA 93117
1-800-667-7872 • FAX 805-692-2525 • www.MossMotors.com



Tools Required:

- Workshop manual
- Jack and jack stands
- Coolant drain pan
- Torque wrench (need 10 – 35 ft-lb)
- Hammer
- Soft rubber mallet
- Pickle fork or ball joint tool (386-205 or DMR139413)
- Small and medium flat screwdrivers
- Small Phillips screwdriver
- ¼" and ⅜" ratchets
- ⅜" socket and combination wrench
- 7/32" socket and combination wrench
- 7/16" socket and combination wrench
- ½" socket and combination wrench
- 9/16" socket and combination wrench
- ⅝" socket and combination wrench
- 1 ⅛" socket or combination wrench
- 15/16" or 1 ½" or 1 5/16" socket (for steering wheel nut)
- Super glue

Read and understand these instructions before beginning the installation of this kit. If you feel your mechanical abilities will be exceeded by this install, find a competent technician to complete it.

These instructions are for the installation of the 667-248 or TTK3000L steering rack conversion on the TR2-TR3A.

You will need a workshop manual to supplement these instructions for disassembly and reassembly that is not covered in depth in these instructions.

Initial Considerations:

1) If you have a mechanical engine cooling fan, you will need to purchase an electric cooling fan kit # 231-710 or RFK10 that has been engineered specifically for the TR2-3. This kit includes the parts necessary to remove the cast iron fan extension

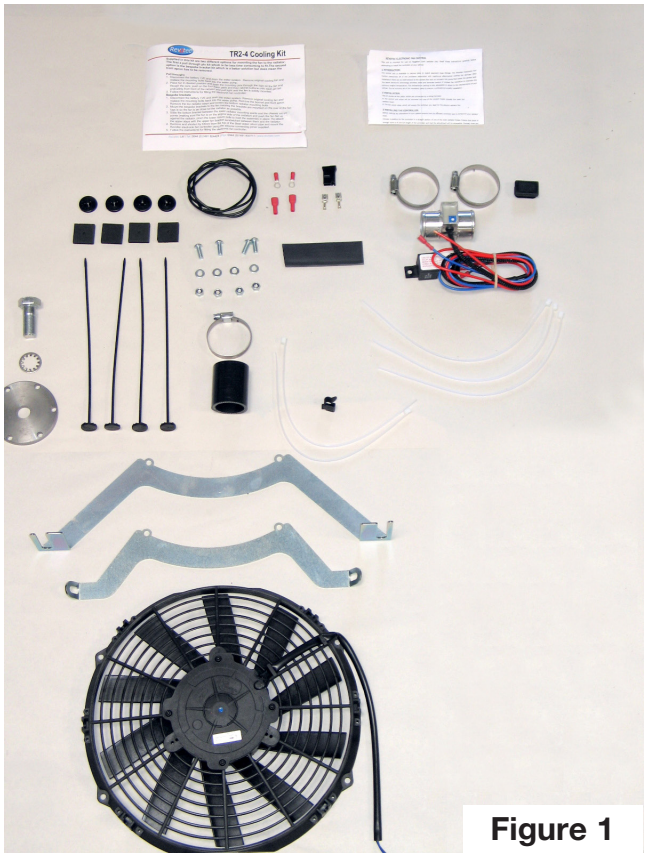


Figure 1

2) If your vehicle has an electric cooling fan but still has the original long cast iron fan extension you must remove the extension. You have several options for removing the extension: You can purchase a ⅜" belt & pulley conversion kit # 837-508 or TT1132.

3) This steering rack conversion kit will render the factory horn and turn signal switches inoperative. You will need horn/turn signal conversion kit # 667-247 to retain horn and turn signal functions.

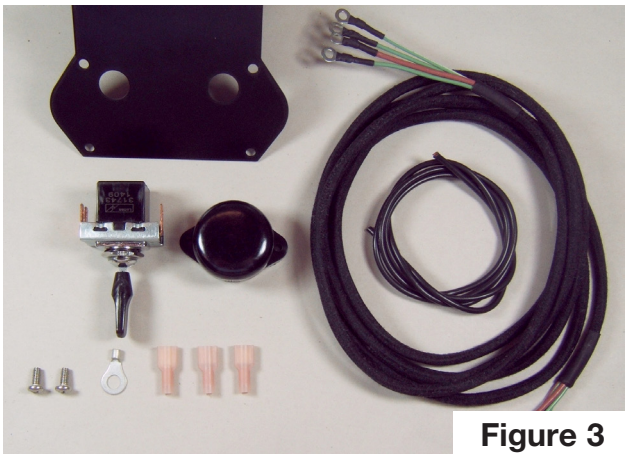


Figure 3

4) If your car has a rigid (long) steering column you will need to purchase upper column kit # 667-249.

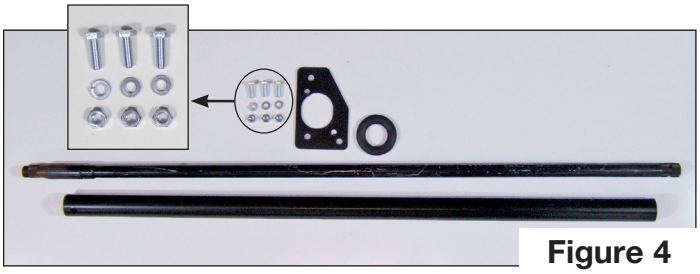


Figure 4

Notes:

- Clearly label all wires as you disconnect them to aid in reassembly.
- The front apron of the car will be removed so it will be a good time to make any upgrades or repairs needed on the front of the engine (mounts, belt drive, radiator, hoses, etc)
- Make sure to thoroughly inspect the front suspension and brakes during teardown to minimize vehicle downtime. It is critical that the front suspension is in good working order (trunnions should swivel freely without being loose) to maximize the performance of this rack kit. If the vehicle has been in a collision and there is frame damage, the vehicle will need straightening for proper steering rack fitment.
- In order install an electric fan, your car will need to be converted to negative ground if it is not already. See the end of these instructions for complete details.

Disassembly

1) On level ground, raise the front of your vehicle so the front tires are off the ground. Support the vehicle using jack stands and wheel chocks. Open the hood and disconnect the ground from the battery. Drain the coolant. Remove the lower radiator hose. Remove the front wheels.

2) Remove the front bumper and irons. Remove the front apron. Use tape to secure wing beading to avoid damaging paint or beading.

3) Remove the top radiator hose, radiator stays and the radiator.

4) Disconnect the wires for the horn and turn signal switches on left hand inner fender well. Loosen the gland nut at the bottom of the steering box using a ⅝" wrench. Loosen the three grub screws on the steering wheel hub using a small Phillips screwdriver. Remove the control head, stator tube and wiring up through the steering column from inside the car.

5) Rigid (long) column cars; remove the steering wheel nut using 15⁄16" or 1 ½" or 1 5⁄16" socket depending on your application. Remove the steering wheel from the steering shaft.

   Split column cars: loosen the upper/lower steering shaft coupler and withdraw the inner steering shaft with the steering wheel attached from the outer steering column.

6) Rigid (long) column cars; loosen the fasteners behind the dashboard that hold the steering column to the chassis.

   All cars: remove any clamps/brackets securing the steering column to the chassis of the vehicle.

7) Separate the tie rods ends from the steering arms using a 9⁄16" socket or wrench, a pickle fork and hammer or ball joint tool (Moss Tool: 386-025 or DMR13913). Separate the drop (pitman) arm from the center link. Leave the drop (pitman) arm attached to the steering box. Remove (2) bolts securing the steering box to the chassis using a 9⁄16" wrench or socket. Remove the steering box (and column) from the vehicle.

Figure 7

8) Remove the (2) bolts securing the idler assembly to the chassis using a 9⁄16" wrench or socket. Remove the idler assembly, center link, and tie rod ends as an assembly.

Figure 8

9) Inspect the chassis for damage or distortion and ensure the (2) mounting brackets on the chassis are to workshop manual dimensions and are properly aligned. You cannot proceed if they are not.

10) Remove the brake calipers using a ⅝" wrench or socket. Remove the rotors using a 13⁄16" wrench or socket.

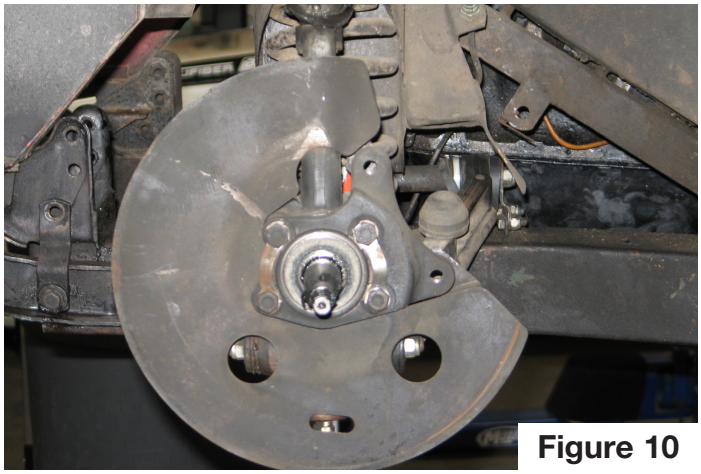


Figure 10

Assembly

11) Swap the steering arms (left steering arm goes on the right spindle and vice versa) using a 9/16" wrench or socket. Use the new 3 1/4" bolts, original spacers new 3/8" flat washers and lock nuts through the front steering arm holes. Use the new 3/8" x 3 1/2" long bolts, new flat washers, new and old spacers stacked for the rear steering arm holes. Torque the steering arm bolts to 35 ft-lb Reinstall the brake rotors and calipers.

Figure 11

12) If your vehicle still has a mechanical fan and or cast fan extension, remove them now. You will need a 1 1/8" socket for the large bolt on the end of the extension and a 7/16" socket and combination wrench for the bolts holding the extension to the crankshaft. If you purchased electric fan kit 231-710 or RFK10, open it and install the extension elimination components onto your vehicle. If you purchased a 3/8" belt & pulley conversion kit 837-508.

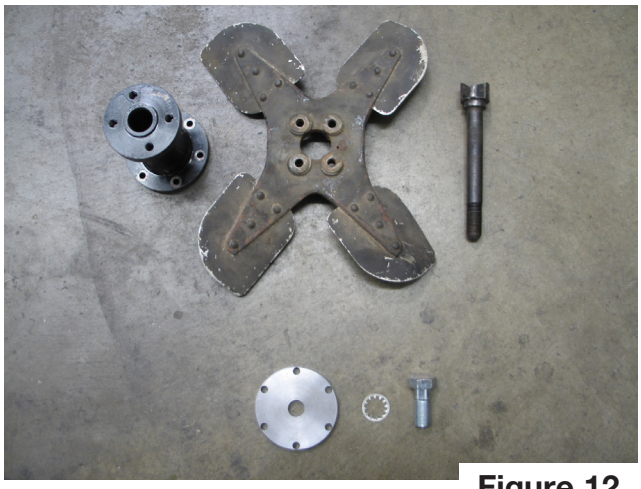
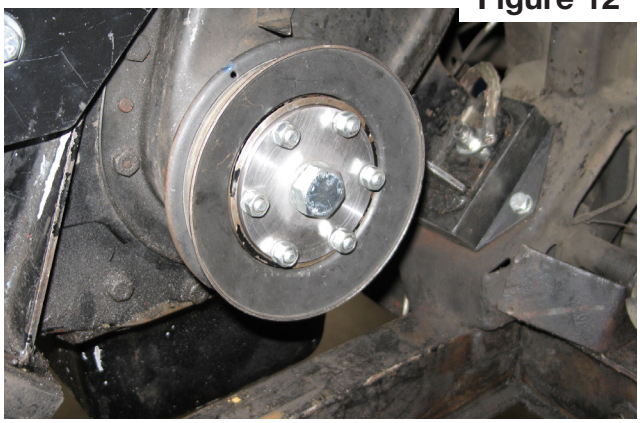
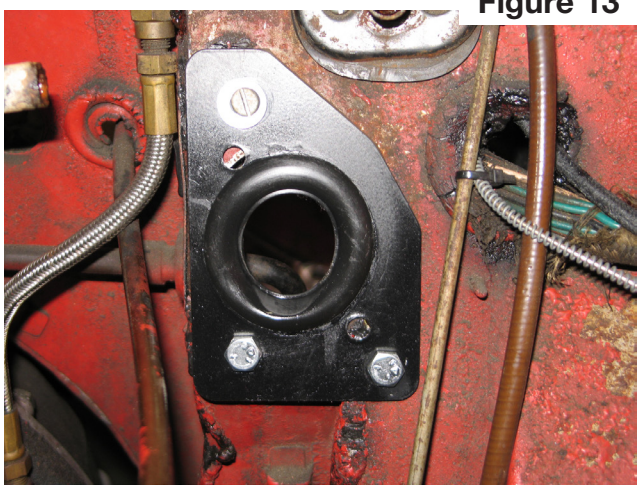


Figure 12



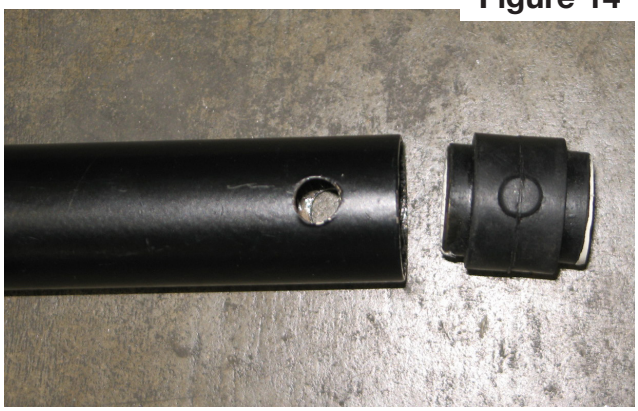
13) **If your vehicle has a split column skip to step 16.** If your vehicle has a rigid column it is time to install the upper column kit # 667-249. Find the firewall plate bracket, (3) ¼" bolts, nuts and lock washers in the kit. Hold the plate up to the fire wall (engine compartment side). Line the upper hole in the plate bracket up with the small hole in the firewall for the screw that secured the steering column boot. If your vehicle doesn't have this screw hole, hold the plate up as pictured in Figure 13. The side of the bracket should be parallel to the edge of the firewall. The large hole in the firewall and plate bracket should be somewhat concentric. Mark and drill the holes pictured and use the hardware included in the kit to install the plate. Use super glue to secure the bushing. This will keep the bushing in place when you install the steering column.

Figure 13



14) Assemble the upper column shaft and bushings: Find the (2) bushings that are rubber on the outside and plastic or nylon on the inside. There should be (1) in the upper steering column kit and (1) in the rack conversion kit. De-burr the holes in the column. Install a bushing in each end of the new steering column*. You may need to trim the rubber nubs off, use lubrication and tap them in with a mallet. Now install the steering shaft down through the bushings. You will need to tap the shaft in to set the height of the upper bushing. Test fit the steering wheel to get the proper height.

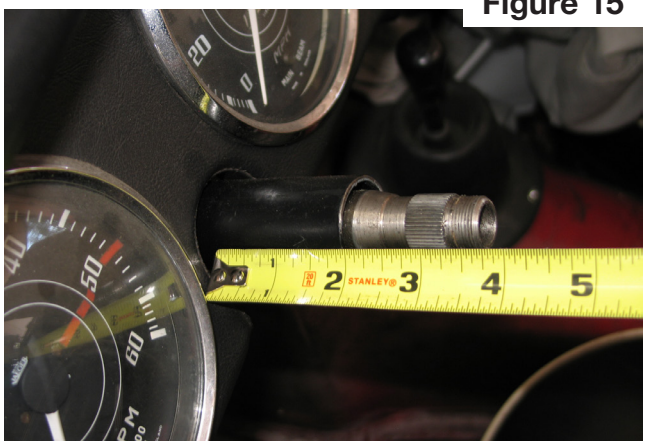
Figure 14



We are replacing the stock upper column felt bush with another rubber/nylon bush which was originally used at the lower end of the column only.

15) Lubricate the firewall bushing and the out side of the new steering column to aid in installation. From inside the vehicle, slip the column into the firewall bushing first and then pull it back up through the mount just behind the dash. The end of the shaft should protrude through the dash about 3 ¾". Snug the upper column mount hardware. It may need adjusting later when you install the lower steering shaft.

Figure 15



16) Split column vehicles; if the bushings are worn in the upper steering column replace them with the bushings supplied in the steering rack conversion kit. Reinstall the upper column in the vehicle.

17) **All vehicles:** install the new steering rack mounting bracket onto the chassis where the old steering box and idler assembly used to mount. This may require tapping the bracket into place with a rubber mallet. Use the (6) new ⅜" x 3 ¼" long bolts, ⅜" lock washers and the anti-crush spacer tubes. Torque the bolts to 35 ft-lb.

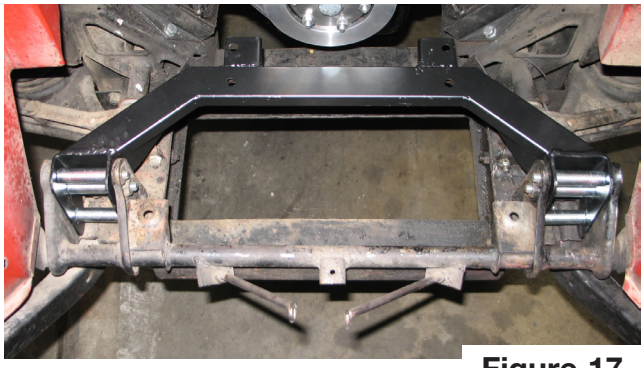
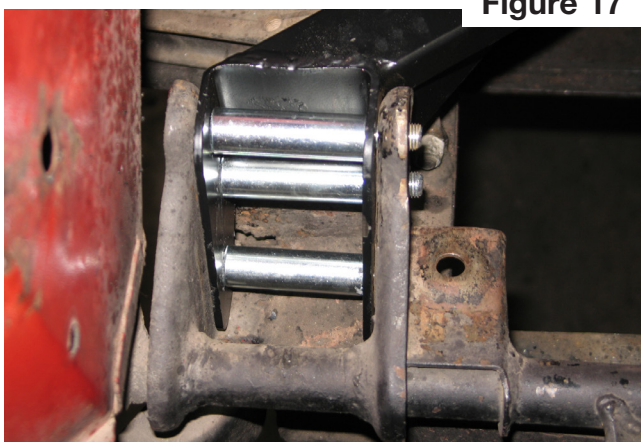


Figure 17



18) Some steering racks will have welding slag in the area where the round middle tube meets the castings on either side. This slag must be removed from the side of the rack with the pinion gear. Use a hammer and chisel and gently knock the slag off.

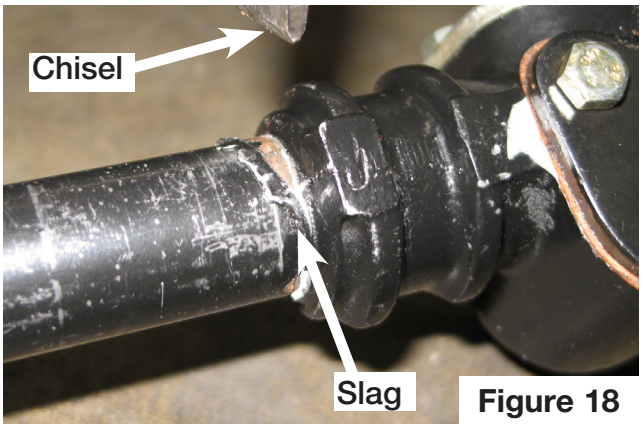
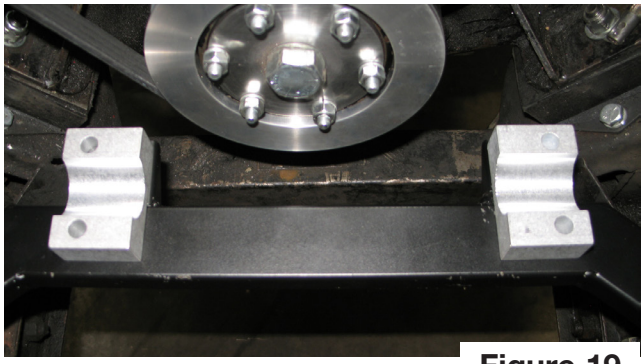
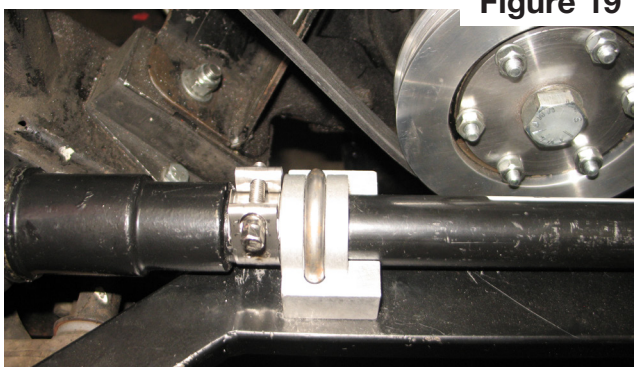


Figure 18

19) Set the rack mounting blocks on the rack mounting bracket. Set the rack in the blocks and install the top of the mounting blocks, the u-bolts, flat washers and locknuts loosely. Do not tighten the u-bolts. They will be tightened in a later step. Place the hose/ tube clamp around the right side of the rack tube so that it is in between the rack casting and the mounting block. Only start the threads on the clamp, do not tighten. The pinion side of the rack should be positioned hard up against the mounting block. The pinion should be pointed toward the end of thesteering shaft where it comes through the firewall. Somewhere in between 30 and 40 degrees up.





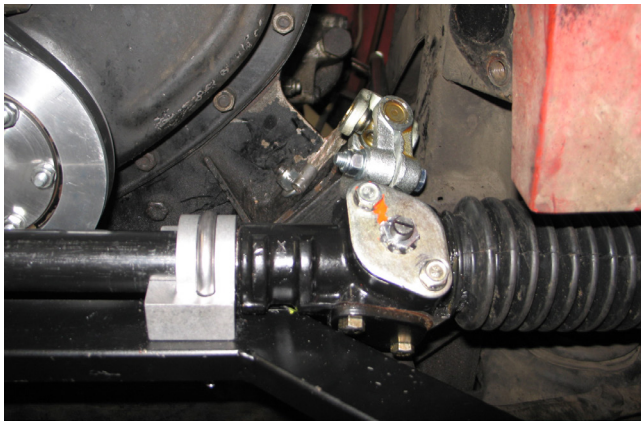
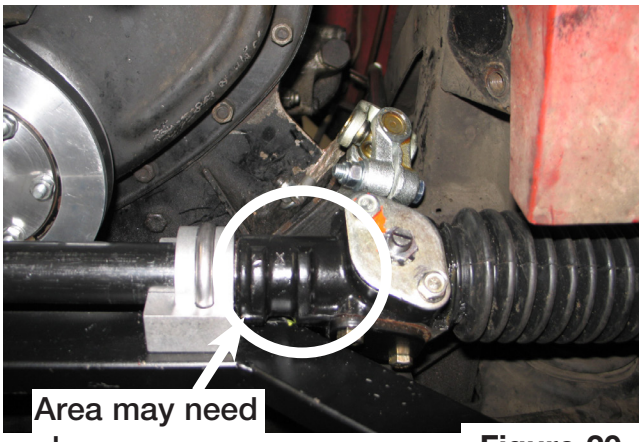


Figure 19

20) After the rack is positioned as described in the previous step, make sure that it is sitting flush in the mounting blocks and that the mounting blocks are flush on the mounting bracket. If the rack or blocks are not flush DO NOT TIGHTEN THE U-BOLTS! The rack will need to be clearanced so that it is not touching the rack mounting bracket. Use a Dremel® tool or grinder to remove material from the underside of the rack casting near the pinion.



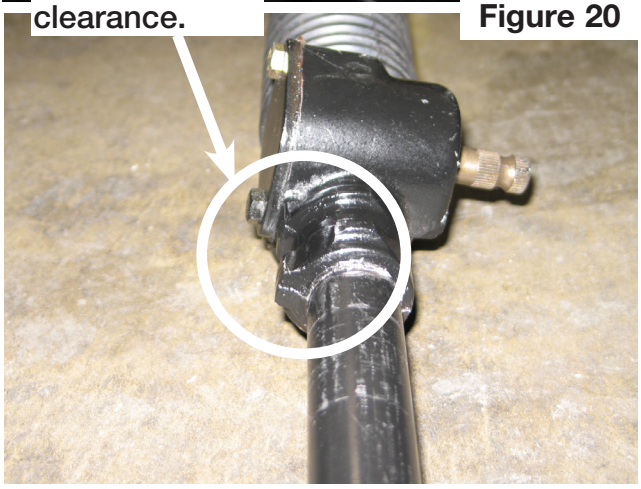


Figure 20

21) Once rack is positioned and clears the mounting bracket correctly snug the u-bolts. If you can wiggle, move, twist or turn the rack in any way, you need to sand the mounting blocks so that they solidly mount the rack to the vehicle. Use a piece of sand paper on a piece of glass. Place the mating surface of the block flat on the sand paper, drawing it back and forth until it fits properly. After proper fitment is achieved, snug the u-bolt just enough to hold it in place but still allow you to adjust the pinion angle. Also check to make sure the u-bolts are threaded 43mm (1.7"). If the threads are not 43mm, the nut will bottom out on the u-bolt rather than tightening up against the rack mount. If the threads are too short, we can send you new u-bolts, or you can simply extend the threads slightly using a 5⁄16"–24 die.

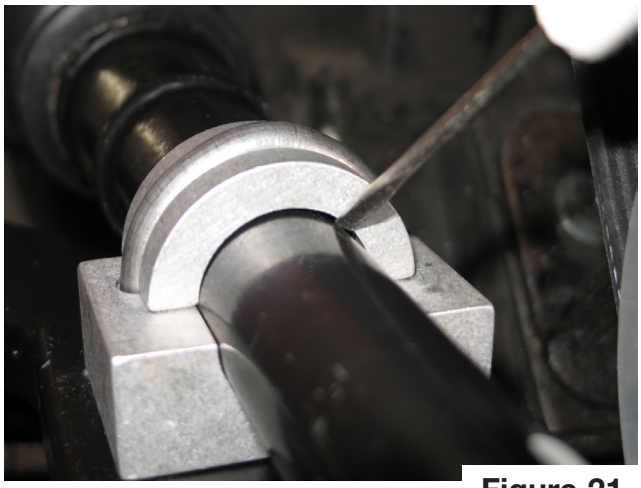
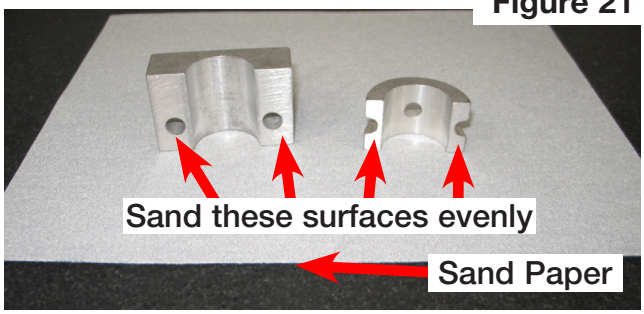
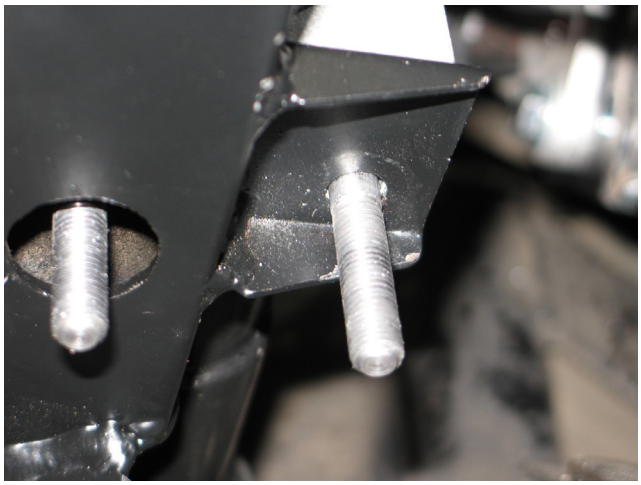


Figure 21





22) Install the lower steering shaft with u-joint, onto the pinion. Install a 5⁄16" x 1 3⁄4" bolt through the u-joint, securing the shaft and pinion together. Install a 5⁄16" flat washer and lock nut. Torque to 15 ft-lb using 1⁄2" socket and wrench.

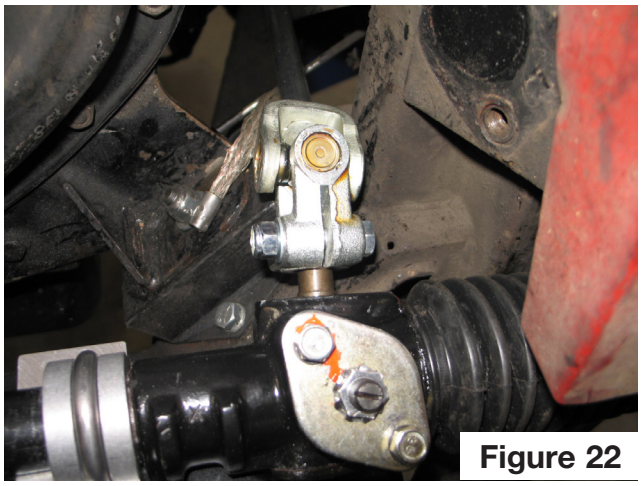


Figure 22

23) Install the remaining u-joint onto the end of the new lower steering shaft. Install the other 5⁄16" x 1 3⁄4" bolt, flat washer and lock nut to secure the u-joint to the steering shaft. Torque to 15 ft-lb using 1⁄2" socket and wrench.

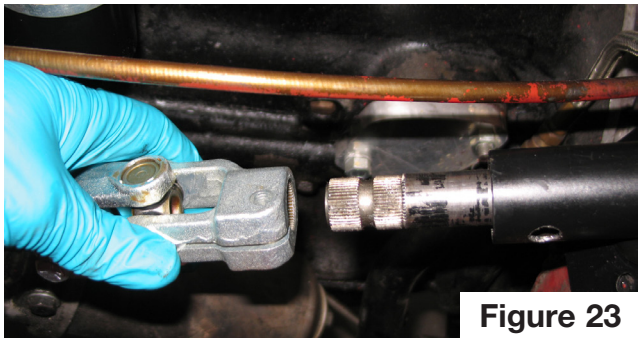


Figure 23

24) Install the upper steering shaft down into the u-joint. Use the ¼" x 1 ¾" bolt, flat washer and lock nut to secure the upper steering shaft to the u-joint. If you have a split column; do not torque the bolt at this time because your steering wheel is still attached to the column. Later when you install the tie rod ends and road wheels you will need to pull this shaft back out of the upper u-joint to align the road and steering wheels. Solid column vehicles; torque this bolt to 10 ft-lb using a 7/16" socket and wrench. You will be installing the steering wheel later.

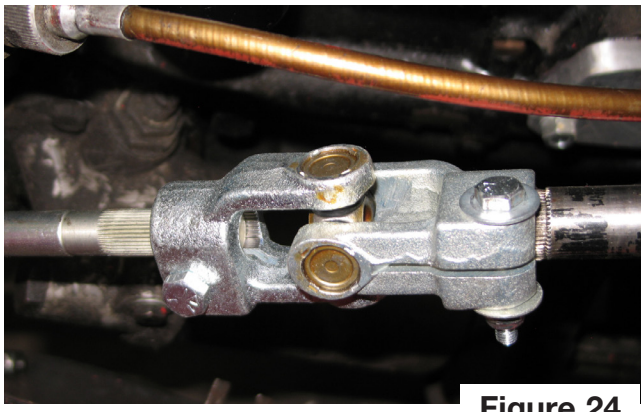
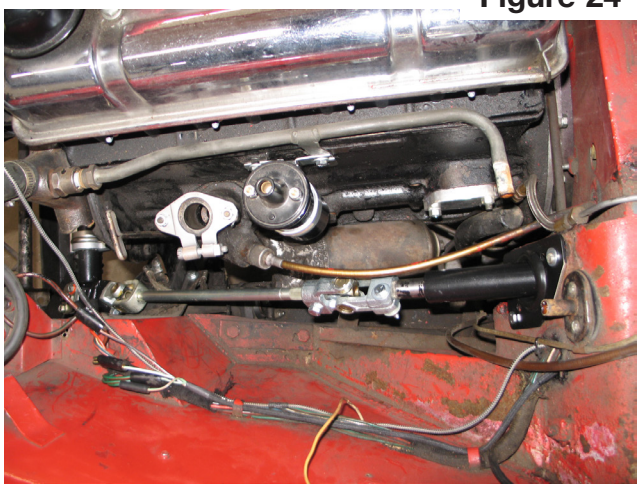


Figure 24



25) **If you have a solid column:** temporarily install the steering wheel onto the shaft, no need to install the nut. All vehicles; Turn the steering wheel back and forth several times and make sure there is no contact between the chassis and the steering shaft. Pay close attention to the lowest u-joint at the engine mount and the chassis. The fasteners securing the upper column and the steering rack should only be snug at this point to allow for adjustment. If the u-joint cannot be adjusted away from the engine mount you need to remove the lower shaft and clearance the engine mount using a grinder or dremel tool. If the u-joint is touching the chassis, it is a good indication that your chassis is not straight and you cannot continue this install without first correcting it. Once the rack and column have been properly adjusted, tighten the rack mount u-bolt nuts to 14 ft-lb using a ½" socket. DO NOT OVER TIGHTEN! You will break the upper clamp or crush the steering rack! Tighten the upper column mount hardware.

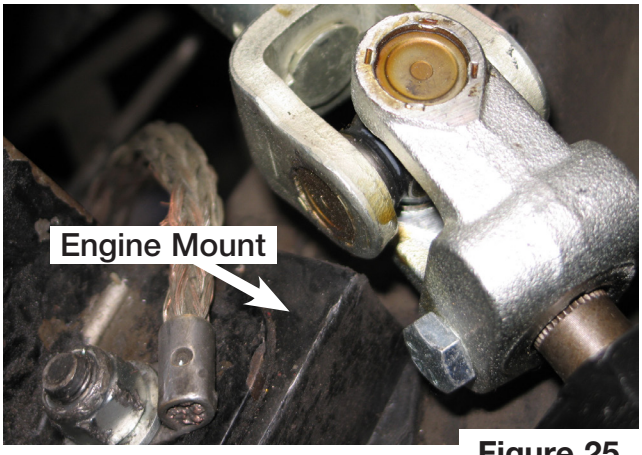
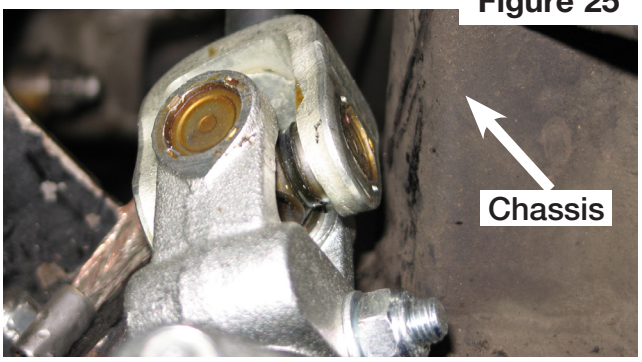


Figure 25



26) Install a large nut onto each tie rod. Install a track (tie) rod end 15 turns, onto each tie rod as a starting point for alignment. No need to snug the nuts up against the track (tie) rod ends at this point because you will need to make a final adjustment with the vehicle's full weight on the tires. Install the track (tie) rod end studs down through the steering arms and reinstall the nuts. Torque them to 35 ft-lb using a 9/16" socket.

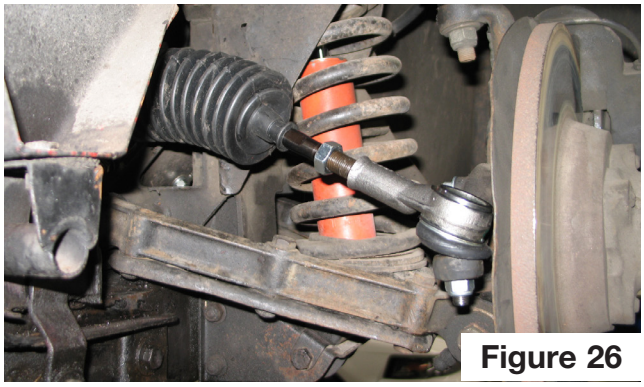


Figure 26

27) Double check that the brake caliper and rotor hardware is at proper torque. Install the wheels and torque them to factory specification. Point the road wheels straight ahead and install the steering wheel. Split column cars may need to pull the upper shaft out of the u-joint, turn the wheel and reinstall it to center the steering wheel. Once the steering and road wheels have been aligned with each other, tighten all the steering shaft u-joint bolts, 5/16" bolts to 15 ft-lb and 1/4" bolt to 10 ft-lb Solid column vehicle may now install the steering wheel nut and torque to factory specification.

28) If you are using your stock steering wheel, you will need to disassemble the control head to remove the turn signal and horn wires. Remove the (3) screws closest to center of the control head. Gently slide the metal rear piece of the control head down the wires. Remove the (3) screws around the outer edge of the control head using a flat screwdriver. Carefully remove the front cover, horn push and horn push spring. This will expose the (2) screws that run through to the back of the control head. Use a small flat screw driver to hold the head of the screw while you remove the nut holding the wire on the back side. Remove the wire from the screw, reinstall and tighten the nut. You must be very careful removing the other (3) wires or the screws will drop into the control head and you will have to totally disassemble it to get them out. Flip the control head over so that the wires are pointing to the ground. Remove (1) nut from (1) wire (and yes it is awkward). Remove the wire from the screw and reinstall the nut without pushing the screw up into the control head Tighten the nut. Repeat this procedure, (1) at a time for the remaining (2) wires. Once all the wires have been removed from the control head, pull the wire through the metal rear piece and reassemble the control head. Recheck steering wheel nut torque, install the control head and tighten the grub screws.

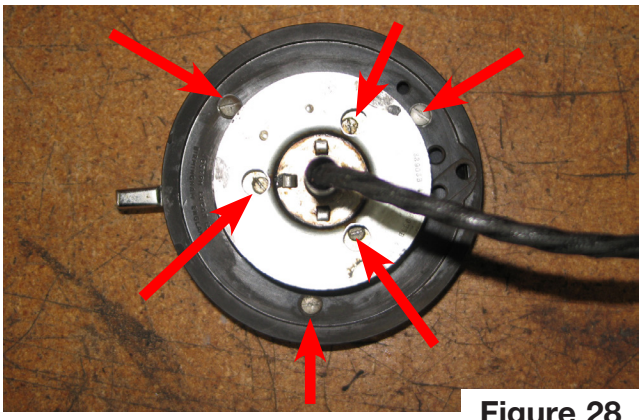
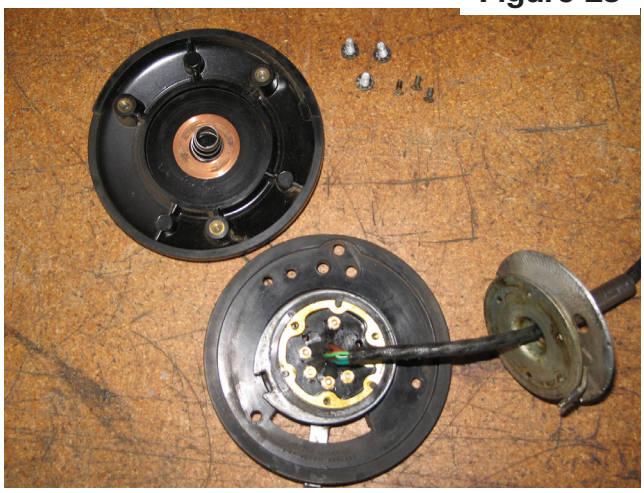
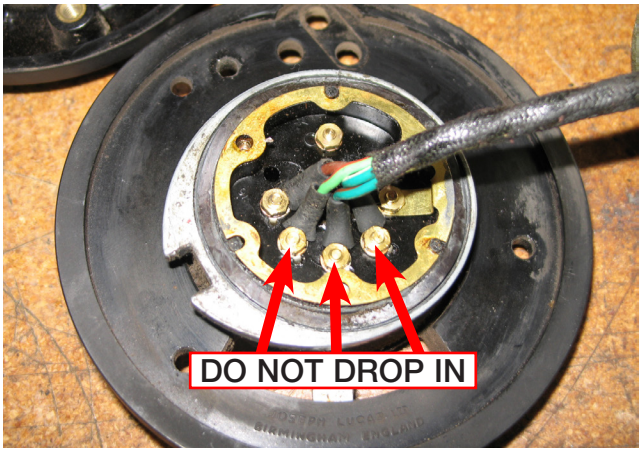


Figure 28





29) If you purchased the horn/turn signal conversion kit 667-247, install it now using the instructions provided in that kit.

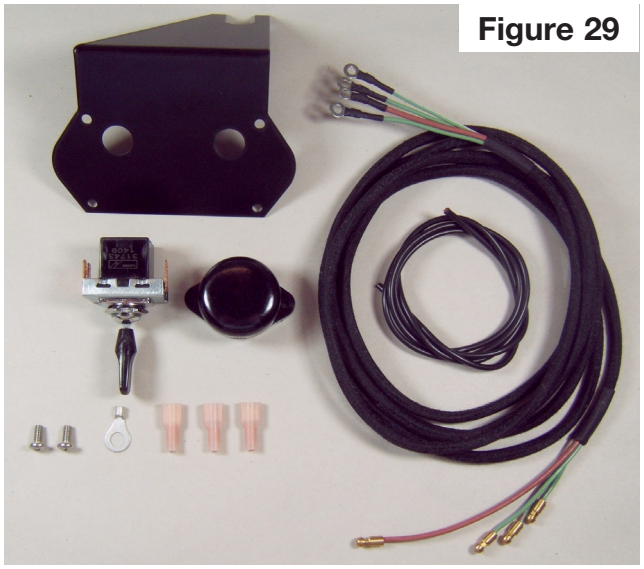


Figure 29

30) Re-torque all the fasteners related to the steering rack conversion and upper column kit.

¼" Bolt on upper steering shaft u-joint	10 ft-lb
5⁄16" Bolts on steering shaft	15 ft-lb
5⁄16" Rack hold down u-bolts	14 ft-lb
⅜" Tie rod end studs	35 ft-lb
⅜" Rack bracket and steering arm bolts	35 ft-lb
5⁄16" Column to chassis	15 ft-lb
Road wheel lug nuts	Factory specification
Brake calipers	Factory specification

31) Install the electric fan onto the radiator following the instructions provided in that kit. Remember, you must convert from positive to negative ground. Instructions for this process are on the next page.

32) Reinstall the radiator, apron and bumper.

33) Perform a toe (track) adjustment as outlined in the factory manual. Make sure to tighten the lock nuts up against the tie rod ends. You can now drive to an alignment shop to have the vehicle properly aligned.

Or

Have your vehicle towed to an alignment shop and have it aligned.

Converting your Triumph from Positive to Negative Ground

1) Disconnect the battery cables and remove the battery

2) If you have an original radio, remove it.

3) If you have an ammeter, you'll need to reverse the wires connected to it.

4) Some distributors may have a diode across the points rather than a condenser. Reverse the connections to the diode.

5) If you have converted to an electric fuel pump, make certain it can be reconfigured to work in a negative ground electric system.

6) Reverse the connections going to the ignition coil: Connect the (-) side of the coil to the wire going to the distributor and the (+) side of the coil to the wire going to the ignition switch.

7) Reverse the connections to the heater fan motor. If you don't, the fan motor will rotate backwards.

8) Replace the battery by rotating it 180 degrees so that the negative battery terminal is connecting to the cable strap that attaches directly to the body/chassis.

9) Disconnect the two leads to the generator. Temporarily connect one end of a length of wire to the positive terminal of the battery. Touch the other end of the wire to the F terminal on the generator (the one the smaller lead is connected to, the wire is brown with a green stripe) several times briefly. You'll get a few sparks and that's ok. This re-polarizes the field windings so you get the proper output.

10) Reconnect the two leads to the generator.

That's it! It is not necessary to change the leads at the starter motor. The starter uses a series-wound motor that will always rotate the correct way with either polarity.

Components for 667-249 Upper Steering Column Kit are displayed here for reference. This kit will need to be purchased seperately.

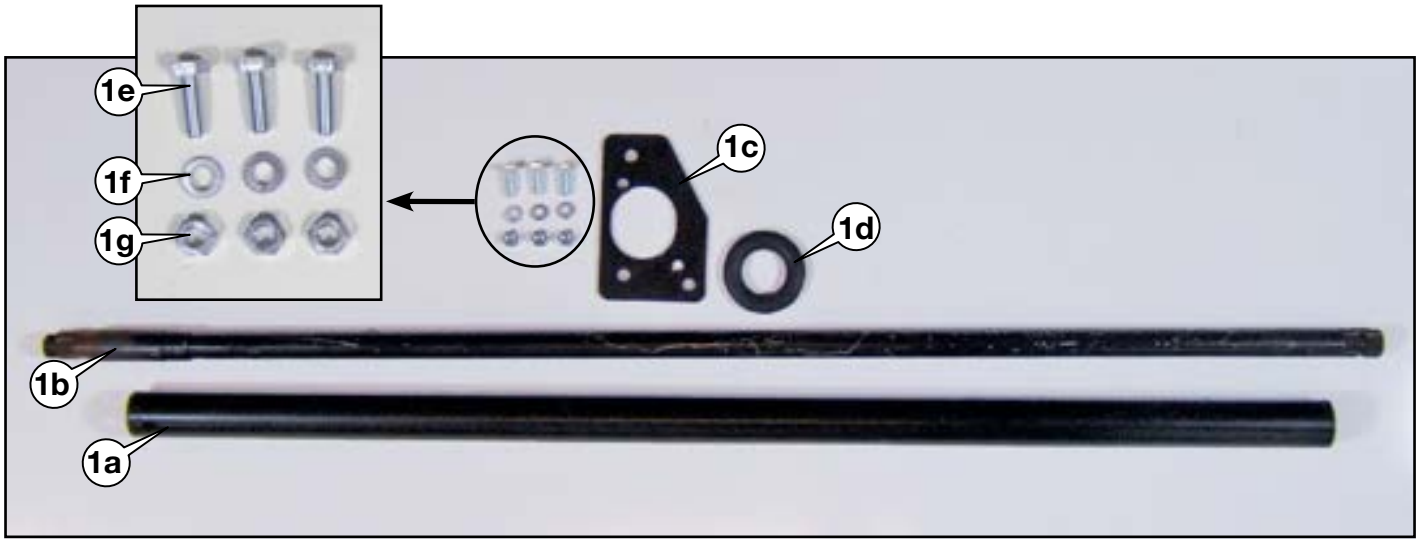
Upper Steering Column Kit

Component List

For TR2-3A LHD with "Long" or "Rigid" Column

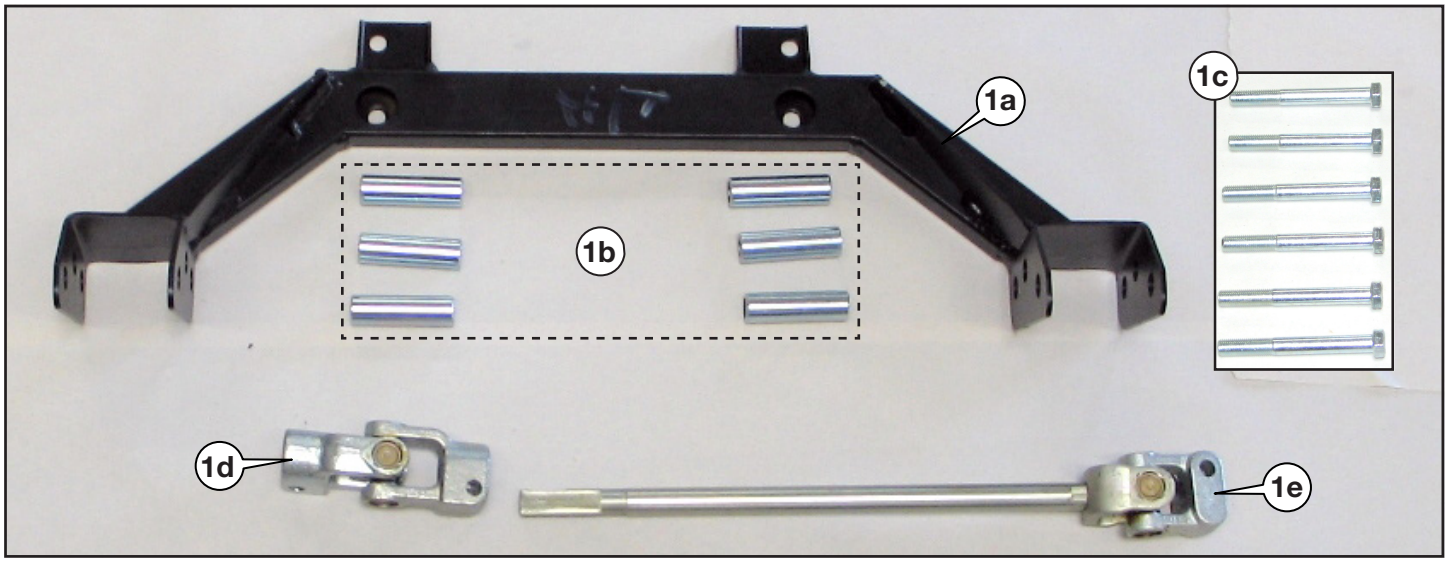
(When fitting a 667-248 Rack & Pinion Conversion)

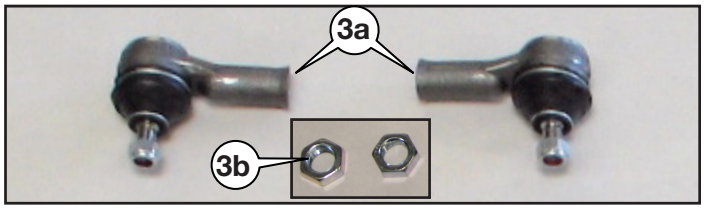
PART# 667-249

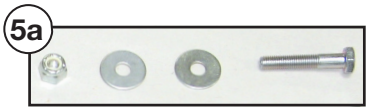


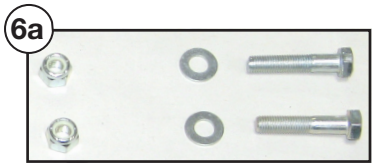
Ref	Moss Europe	Moss US	Quantity	Description
1a	121089	525-005	1 EACH	TUBE, STEERING COLUMN, OUTER
1b	205221	525-015	1 EACH	COLUMN, UPPER INNER
1c	772-846	772-846	1 EACH	BRACKET/PLATE, FIREWALL
1d	3H2506	682-215	1 EACH	GROMMET, STEERING COLUMN
1e	GHF117	322-230	3 EACH	SET SCREW, HEX, 1/4 UNF X 3/4
1f	GHF331	324-020	3 EACH	WASHER, LOCK, 1/4 IN
1g	GHF200	310-760	3 EACH	NUT, HEX, 1/4 UNF, G5, ZINC

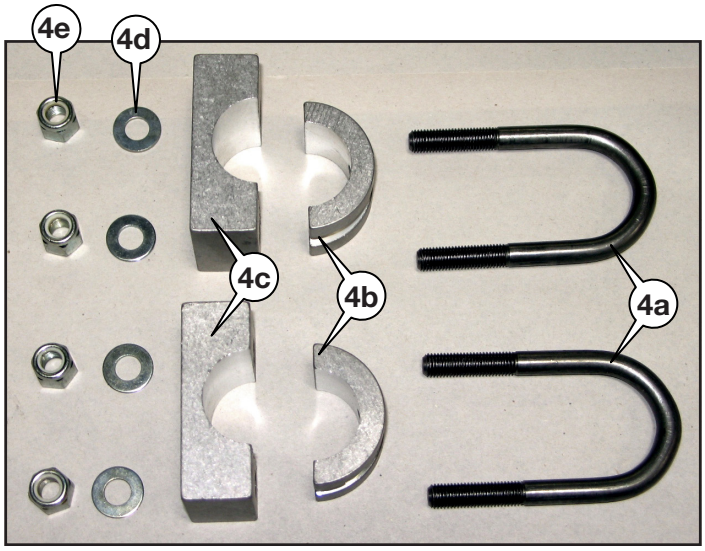
Components for Kit 667-248

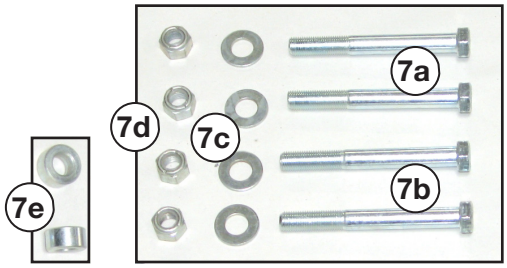












Ref #	Moss EU	Moss US	Description	Qty	Where Used
1a	TTK3000L/BRKT	667-242	STEERING RACK BRACKET LHD	1	mount steering rack to vehicle
1b	NPN	667-244	SPACER, TUBULAR, ⅜ ID	6	anti-crush tubes for rack mounting bracket
1c	BH606261	320-315	BOLT, ⅜ UNF X 3 ¼	6	steering rack bracket to chassis
NA	324-340	324-340	WASHER, LOCK, ⅜ IN	6	steering rack bracket to chassis
1d	UKC2449	072-191	U-JOINT, STEERING COLUMN	1	connect upper and lower steering shaft
1e	TTK3000Q1	667-243	LOWER STEERING SHAFT & U-JOINT	1	connect upper steering column to rack
2a	GSR371MOD	667-241	MODIFIED STEERING RACK LHD	1	
3a	GSJ734Z	114-905	TRACK (TIE) ROD END W/NUT	2	connect steering rack to steering arm
3b	NT608041	310-390	NUT, JAM, ½ UNF, G5, ZINC	2	track (tie) rod end jam nut
	NPN	667-289	MOUNTING KIT, RACK & PINION	1	secures rack to mounting bracket
			Consisting of		
4a		667-301	U-BOLT, RACK MOUNT, 5.16-24	2	secures the
4b		667-290	BLOCK, RACK MOUNT, TOP	2	on top of the rack & pinion unit
4c		667-285	BLOCK, RACK MOUNT, BOTTOM	2	under the rack & pinion unit
4d		365-720	WASHER, FLAT, 5⁄16 ID	4	for the u-bolts securing the rack.
4e		310-290	NUT, NYLOC, 5⁄16 UNF	4	for the u-bolts securing the rack.
5a	209423	525-020	BUSH, STEERING COLUMN	1	lower column bushing
5a	HB714P	320-435	BOLT, ¼ UNF X 1 ¾	1	upper steering shaft u-joint
5a	WM57	324-115	¼ FLAT WASHER	1	upper steering shaft u-joint
5a	GHF221	312-000	NUT, NYLOC, ¼ UNF	1	upper steering shaft u-joint
6a	BH605141	322-440	BOLT, 5⁄16 UNF X 1 ¾	2	(1) upper steering shaft u-joint
6a					(1) lower steering shaft u-joint
6a	GHF301	365-720	5⁄16 FLAT WASHER	2	(1) upper steering shaft u-joint
6a					(1) lower steering shaft u-joint
6a	GHF272	310-105	5⁄16 LOCK NUT	2	(1) upper steering shaft u-joint
6a					(1) lower steering shaft u-joint
7a	BH606261	320-315	BOLT, ⅜ UNF X 3 ¼	2	front of steering arms
7b	BH606281	320-340	BOLT, ⅜ UNF X 3 ½	2	rear of steering arms
7c	GHF302	324-860	WASHER, FLAT, ⅜ ID	4	steering arms
7d	GHF273	310-510	NUT, NYLOC, ⅜ UNF, THIN	4	steering arms
7e	152145	667-755	SPACER, TUBULAR	2	rear of steering arms
NA	043314	520-050	BUSH, FELT, STEERING COLUMN	1	upper steering column bushing
NA		772-836	HOSE/TUBE CLAMP, STAINLESS	1	locate steering rack